

## TRANSITION YEAR UMBRELLA GRANT

### DISCUSSION

#### **BACKGROUND**

Theodor D. Sterling and Associates Ltd. (TDSA) had been funded by an umbrella grant since 1973. The purpose of this grant was to permit a group of competent investigators and professionals to:

1. Review the field of smoking and health, concentrating on the most important issues;
2. Initiate and, if possible, implement appropriate investigations that would throw light on smoking and health issues; and
3. Provide a research facility to readily respond to special claims of immediate concern.

All results of investigations and of literature reviews were to be published, as appropriate.

Since the early 1980's, a growing percentage of the umbrella grant moneys have been devoted to Indoor Air Quality (IAQ), Building Science and Environmental Tobacco Smoke (ETS)-related research. Some funding in addition to the umbrella grant has also been provided. This funding has been identified with special projects such as development of a Building Performance Database, organization of an international conference in Brussels and preparation of submission materials to both the U.S. Occupational Safety and Health Administration (OSHA) and the U.S. Environmental Protection Agency (EPA).

The general nature of the umbrella grant has enabled our investigators flexibility in determining project priority. This has made it possible to respond to issues of growing importance in a timely way. The budget from the umbrella grant used for IAQ, Building Science and ETS issues has been applied to basic research projects, research reviews, as well as dissemination of information by preparation and presentation of articles and

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presentations for peer reviewed publications and conferences. To date, this research has resulted in over 200 publications and conference presentations.

The attached bibliography contains a complete reference list of relevant papers published under the umbrella grant and special projects by staff of Theodor D. Sterling and Associates Ltd. The bibliography is divided into two sections:

- Publications and presentations on IAQ and Building Science issues of relevance to ETS and its effect on non-smokers.
- Publications and presentations of epidemiological and statistical studies of relevance to ETS exposure and its effect on non-smokers.

The effectiveness of the umbrella grant to anticipate directions of research and respond to claims about active and passive smoking can be judged from the timely publication of scientific and technical articles dealing with specific issues:

- Development and field validation of protocols for the investigation of IAQ problems.
- Field research into the use of CO<sub>2</sub> data as a tool for investigating IAQ problems.
- Monitoring of ETS-related substances and other IAQ parameters in office buildings under a variety of ventilation configurations and different workplace smoking practices.
- Investigation of the impact of IAQ and ventilation on office workers productivity, performance and absenteeism.
- Development of a questionnaire survey, the "Office Workplace Environmental Survey" (OWES) and field validation in office buildings in the U.S., Canada and the U.K.
- Formulation of architectural and engineering design guidelines for the avoidance and mitigation of IAQ problems.
- Investigations of IAQ and thermal comfort problems in office buildings, schools and other non-industrial environments.
- Test chamber experiments and field monitoring of the impact of various commercially available air cleaners on ETS-related concentrations.

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- Study of the impact of different ventilation levels on perceived and measured IAQ conditions in an office building in Columbus, OH.
- Preliminary protocol development for a major, multi-building study of ventilation, IAQ (including ETS-related substances) and energy performance.
- Re-analysis of available data on the impact of different ventilation rates on objective and subjective measurements of IAQ and occupant health and comfort.
- Field monitoring of combustion by-products from gas stoves and other household appliances.

In addition to basic research, the umbrella grant has facilitated the establishment of a research resource center capable of responding quickly and efficiently to special project needs of the Industry. Recent examples of such special projects have been responses to the U.S. Environmental Protection Agency on the proposed Workplace Smoking Guidelines, OSHA on the Request for Information on IAQ Rule Making, and assistance provided to Shook, Hardy & Bacon on IAQ considerations and possible study for the ongoing Mississippi Barber litigation.

## TRANSITION YEAR GRANT PROPOSAL

We are proposing here that funding for a new umbrella grant be approved for a transition year to provide ongoing support for a multi disciplinary research team focusing on IAQ, Building Science and ETS research issues. The Intent of this grant is twofold:

1. To conduct research on timely issues; and
2. To maintain a research resource center capable of effectively responding to needed clarification of environmental issues.

This grant is urgently required. The current umbrella grant has been discontinued as of March 31, 1994. Unless the transition year grant is in place at that time, Theodor D. Sterling and Associates Ltd. will cease to be capable of quickly and efficiently responding to issues of concern.

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Projects will be outside the scope of this grant when they require extensive additional research and preparation, such as the recently organized Brussels conference and submissions to OSHA regarding the impending notice of IAQ Rule Making.

The funding Theodor D. Sterling and Associates Ltd. is requesting for the transition year will be used initially to undertake a number of research projects that will provide background information of specific importance to pending OSHA Rule Making, such as:

1. EFFECT OF DIETARY NICOTINE ON THE USE OF COTININE AS AN ETS MARKER

The Centers for Disease Control (CDC) are currently publicizing preliminary results of a 23,000 subject study of cotinine as a marker of ETS exposure. CDC researchers claim that measurable cotinine levels found in all of the initial 800 subjects tested were a direct result of ETS exposure either in the workplace or at home. This evidence is being used to persuade OSHA that special workplace ETS regulations are required and that cotinine is an effective marker for exposure of non-smokers to ETS.

In their public comments, however, CDC researchers either neglect to address or trivialize the major confounding factor of dietary nicotine sources (i.e. nicotine found in foods).

A two part study will be undertaken to evaluate the significance of dietary nicotine sources on cotinine levels.

- i. Review available literature.
- ii. Design the protocol and assemble a clinical research team to conduct a clinical study relating intake of nicotine containing foodstuffs to cotinine levels. (A human volunteer study of subjects eating high and low nicotine containing foods.) A special project budget may be required for undertaking the clinical work.

The results of this two part study would be presented to OSHA to counterbalance and influence the CDC study. The results would establish benchmarks for non-smokers' cotinine levels.

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2. THE IMPACT OF THERMAL VARIABLES ON THE CALIBRATION AND ACCURACY OF ETS MEASUREMENTS WITH PORTABLE PARTICLE MONITORS

in the course of discussion regarding approval of an ASTM standard practice for calibrating portable particle monitors to ETS, EPA representatives have indicated that inaccuracies caused by the effect of temperature and humidity may discredit much of the EPA's past ETS particle measurements (i.e. Repace). This project will assemble data by way of laboratory tests on the impact of thermal variables on ETS measurements. The tests will be undertaken in compliance with ASTM standard procedures and will be published by ASTM.

### 3. MULTI BUILDING IAQ/ENERGY STUDY

In the spring of 1992, we proposed a multi building IAQ/Energy study of Building Owners and Managers Association (BOMA) member buildings. This project has not yet been funded and is timely. The opportunity of access to BOMA members has been provided through our local BOMA organization. The objective of the study is to provide support for the Building Performance approach to IAQ control by demonstrating:

- (1) That ASHRAE 62-1989 is an effective method of controlling occupant exposure to indoor substances including ETS; and
- (2) That meeting ASHRAE 62-1989 is not prohibitively energy intensive or expensive.

The study of BOMA members' buildings could be used to question the evolving BOMA official position that prohibition of smoking is the principle means of effective IAQ control. By demonstrating the effectiveness of the Building Performance Approach, the effect of BOMA lobbying of OSHA as well as State and local regulating agencies in favor of prohibiting smoking could be mitigated.

#### 4. IMPACT OF IAQ ON WORKERS PERFORMANCE & PRODUCTIVITY

In their initial Request For Information, OSHA identified the costs associated with poor IAQ to be an important issue. At the time, there was little if any actual cost information available regarding the effect of IAQ on workers performance and productivity. However, there has been a considerable amount of recent research amongst architects, ergonomists, and environmental psychologists on the impact of improving indoor environmental conditions (indoor air quality) on human performance.

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Specifically researchers at Carnegie Mellon University, Rensselaer Polytechnic Institute and Steelcase Inc. among others have undertaken recent studies. This research indicates that there may be up to a 16% improvement of human performance in healthy buildings.

The project will be limited to a review of this new literature and, if appropriate, preparation of a review paper that translates performance into actual operating costs. This review would provide further information to OSHA regarding the total economic impact of poor IAQ and would also place IAQ in the context of other environmental stressors such as temperature, illumination and noise.

##### 5. COST EFFECTIVENESS OF ETS FILTRATION

Federal and State proposed and implemented IAQ regulations tend to prohibit the recirculation of air from smoking lounges. The reason being the absence of economically viable and effective filtration for semi volatile organic compounds and other gas phase constituents of ETS. The 3M corporation believes that they may have the technology to provide a cost effective filter to remove ETS.

Our project would involve providing scientific support to 3M for development of an ETS filtration product.

We will deal with the question of whether or not restaurant or bar workers have elevated risks for cancer or other disease by conducting a study of sex- and cause-specific relative risk for bartenders and restaurant workers. The data needed to determine the lung cancer and other disease risks of bartenders and restaurant workers relative to the mortality experience of the general population, of employed individuals, and of blue collar workers is available from the combined data of the 1986 National Mortality Followback Survey (NMFS) and the National Health Interview Survey (NHIS). These databases include representative samples of the entire U.S. population and decedents and are already in our possession. The statistical method we will follow was described in Weinkam, Rosenbaum and Sterling, published in the *American Journal of Epidemiology* in 1992.

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A study of these data would effectively determine the relative mortality risk for bartenders and restaurant workers, untarnished and independent of a possible publication bias.

Besides the analysis of relevant mortality data for bartenders and restaurant workers, a study of the claims made by Siegel will also include a thorough review of the literature, especially of the studies which are used by Siegel in his meta-analysis and of the studies excluded from this analysis for possibly frivolous reasons.

## RESEARCH TEAM MEMBERS

The new umbrella grant will utilize the multi disciplinary team of competent investigators and professionals specializing in IAQ, Building Science and ETS issues that was brought together under the previous grant. This group consists of the following core members:

Elia Sterling	Principle Research Architect
Chris Collett	Senior IAQ Scientist
James Ross	Senior IAQ Technician
Theodor Sterling	Epidemiologist

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## TRANSITION YEAR BUDGET

Theodor D. Sterling and Associates requests a transition year grant commitment of \$342,036 per year. This budget is based on the following expenditures:

### PERSONNEL

Researcher Architect	\$ 53,000	
Senior IAQ Scientist	48,000	
Senior IAQ Technician	28,000	
Epidemiologist	20,000	
Additional Consultants: <sup>1</sup>	18,000	
(as required)		
Clerical Support	<u>35,000</u>	
		\$ 203,000
12% Direct cost on salaries	<u>24,360</u>	
TOTAL SALARIES		\$ 227,360

### EQUIPMENT AND EXPENSES

Data Acquisition/Instrumentation	\$ 20,000	
Telephone/Courier, Artwork/Graphics	<u>6,000</u>	
TOTAL EQUIPMENT AND EXPENSES		\$ 26,000
35% Administrative Overhead		<u>88,676</u>
TOTAL BUDGET <sup>2</sup>		<u>\$ 342,036</u>

<sup>1</sup> Industrial Hygienist, Mechanical Engineer, Environmental and Health Scientists, Computer Analyst

<sup>2</sup> All unexpended funds will be returned to the sponsor at the end of the granting period.

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**REPORTING**

A Transition Year Status Report will be provided as well as copies of all studies, published articles and conference presentations. All publications resulting from research undertaken funded by this grant will fully acknowledge the support provided by the sponsors.

## APPENDIX

A BIBLIOGRAPHY OF RELEVANT PAPERS PUBLISHED UNDER  
THE UMBRELLA GRANT TO THEODOR D. STERLING AND ASSOCIATES LTD.

The bibliography is divided into two sections:

- List 1: Publications and presentations of IAQ and Building Science issues of relevance to ETS and its effect on non-smokers.
- List 2: Publications and presentations of epidemiological and statistical studies of relevance to ETS exposure and its effect on non-smokers, and publications and presentations dealing with epidemiological and statistical issues which, while not directly related to ETS issues, are relevant background materials.

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**List 1: Publications and Presentations in IAQ Building Science Issues of  
Relevance to ETS and Its Effect on Non-Smokers**

- Air Pollution and Smoking. Environment, 15(6):3-5, 25-26, 1973. (T.D. Sterling)
- Pollution in Public Buildings. Journal of Architecture Research, 6:13-19, 1977.  
(E.M. Sterling)
- Exposure to Pollutants in Enclosed "Living Spaces". Environmental Research, 13:1-35,  
1977. (T.D. Sterling, D. Kobayashi)
- Architecture Research: Educating the Professional. Proceedings, 1979 Annual Meeting  
of the Association of Collegiate Schools of Architecture, Savannah, 1979.  
(E.M. Sterling)
- The Impact of Air Pollution on Residential Design. pp.413-423 In Environmental  
Design: Research, Theory, and Application, A.D. Seidel, S. Danford (eds),  
Environmental Design Research Association, Buffalo, 1979. (E.M. Sterling)
- Carbon Monoxide Levels in Kitchens and Homes with Gas Cookers. Journal of the Air  
Pollution Control Association, 29(3):238-241, 1979. (T.D. Sterling, E.M. Sterling)
- The Case for Entirely Removing the Gas Stove from Indoors. Proceedings,  
International Symposium on Indoor Air Pollution, Health and Energy Conservation,  
Amherst, 1981. (J.J. Weinkam, E.M. Sterling, T.D. Sterling)
- Use of Gas Ranges for Cooking and Heating in Urban Dwellings. Journal of the Air  
Pollution Control Association, 31(2):162-165, 1981. (T.D. Sterling, D. Kobayashi)
- The Effect of Air Control Systems on the Indoor Distributions of Viable Particles.  
Environmental International, 8:409-414, 1982.  
(D.A. Sterling, C. Clark, and S. Bjornson)
- Indoor Byproduct Levels of Tobacco Smoke: A Critical Review of the Literature.  
APCA Journal, 32(3):250-259, 1982. (T.D. Sterling, H. Dimich, D. Kobayashi)
- The Epidemiology of Building Illness. Proceedings, Second International Symposium of  
Epidemiology in Occupational Health, Montreal, 1982.  
(T.D. Sterling, E.M. Sterling)

2023699229

The Effects of Ventilation on Residential Air Pollution Due to Emissions From a Gas Fired Range. Environment International, 8:447-452, 1982.

(G. Traynor, M.G. Apte, J.F. Dillworth, C.D. Hollowell, E.M. Sterling)

Building Environment Modification: An Experimental Study. Proceedings, Indoor Air Conference, University of Washington, Seattle, 1982.

(E.D. McIntyre, E.M. Sterling)

Photochemical Smog Production in Modern Sealed Buildings. Proceedings, Annual General Meeting of the Northwest Chapter of APCA, Vancouver, 1982.

(E.M. Sterling, T.D. Sterling)

Health and Comfort Problems in Air Conditioned Office Buildings. pp.7B.1-7B.10 In Proceedings, Second International Congress on Building Energy Management, Ames, 1983.

(E.M. Sterling, T.D. Sterling)

New Health Hazards in Sealed Buildings. American Institute of Architects Journal,

April:64-67, 1983. (E.M. Sterling, T.D. Sterling, E.D. McIntyre)

The Impact of Different Ventilation Levels and Fluorescent Lighting Types on Building Illness: An Experimental Study. Canadian Journal of Public Health, 74:385-392,

November/December, 1983. (E.M. Sterling, T.D. Sterling)

Air Quality in Public Buildings with Health Related Complaints. ASHRAE Transactions,

89(2A):198-207, 1983. (T.D. Sterling, E.M. Sterling, H.D. Dimich-Ward)

Review of the Investigations on the Possible Effects of Smoking on Indoor Pollution and on the Incidence of Building Illness. pp.17-32 in ETS - Environmental Tobacco Smoke, R. Rylander, Y. Peterson, M.-C. Snella (eds), Workshop on Effects and

Exposure Levels, Geneva, 1983. (T.D. Sterling, E.M. Sterling)

Effects of Different Ventilation Parameters on Indoor Pollutants. pp.133-140 in

Proceedings, An Engineering Foundation Conference on Management of Atmospheres in Tightly Enclosed Spaces, Santa Barbara, 1983.

(E.M. Sterling, T.D. Sterling)

The Impact of Different Ventilation Levels and Fluorescent Lighting Types on Building Illness: An Experimental Study. Canadian Journal of Public Health, 74:385-392,

November/December, 1983. (E.M. Sterling, T.D. Sterling)

Indoor Pollution Related to Building Energy Conservation. Proceedings, Annual General Meeting of the Northwest Chapter of APCA, Vancouver, B.C., 1983.

(T.D. Sterling, E.M. Sterling, H. Dimich-Ward)

2023699230

**Building Illness in the White Collar Workplace.** International Journal of Health Services, 13(2):277-287, 1983. (T.D. Sterling, E.M. Sterling, H.D. Dimich-Ward)

The Use of Field Sampling Instrumentation for the Monitoring of Non-Industrial Environments. pp.209-214 in Indoor Air (Vol.4), B. Berglund, T. Lindvall, J. Sundell (eds), Swedish Council for Building Research, Stockholm, 1984. (R.M. Monsen, D.A. Sterling, T.H. Stock)

A Survey of Indoor Air Quality in Texas Mobile Homes. pp.331-334 in Indoor Air (Vol.4), B. Berglund, T. Lindvall, J. Sundell (eds), Swedish Council for Building Research, Stockholm, 1984. (T.H. Stock, D.A. Sterling, R.M. Monsen)

**Factors Influencing Formaldehyde Levels in Manufactured Housing.** pp.139-144 in Indoor Air (Vol.3), B. Berglund, T. Lindvall, J. Sundell (eds), Swedish Council for Building Research, Stockholm, 1984.  
(D.A. Sterling, T.H. Stock, D.K. Monteith)

**Architechnology: An Architectural-Technological Integration for Improved Environmental Quality in Buildings.** pp.145-152 in Indoor Air (Vol.5), B. Berglund, T. Lindvall, J. Sundell (eds), Swedish Council for Building Research, Stockholm, 1984.  
(E.D. McIntyre, E.M. Sterling, T.D. Sterling)

The Effect of Sealed Office Buildings on the Ambient Environment of Office Work.  
pp.70-76 in Ergonomics and Health in Modern Offices, E. Grandjean (ed), Taylor  
and Francis, Philadelphia, 1984. (E.M. Sterling, E.D. McIntyre, T.D. Sterling)

Air Quality in Hospitals and Health Care Facilities. pp.209-214 in Indoor Air (Vol.5), B. Berglund, T. Lindvall, J. Sundell (eds), Swedish Council for Building Research, Stockholm, 1984. (E.M. Sterling, D.A. Sterling)

Air Quality in Hospitals and Laboratories. Proceedings, 77th Annual Meeting of the Air Pollution Control Association, San Francisco, 1984.  
(E.M. Sterling, T.D. Sterling, D.A. Sterling)

**Does Indoor Pollution Affect the Economic Performance of Office Buildings?**  
Proceedings, CIB W-55 Third International Symposium on Building Economics,  
 National Research Council Canada, 5:21-28, Ottawa, 1984.  
 (E.M. Sterling, L. Baron)

Baseline Data: Health and Comfort in Modern Office Buildings. pp.17.1-17.13 in Proceedings, 5th AIC Conference: The Implementation and Effectiveness of Air Infiltration Standards in Buildings, Reno, 1984. (E.M. Sterling, T.D. Sterling)

**Air Quality in Health Care Facilities. Proceedings, Ener-Health '84: Energy Management in Health Care Facilities, 1984. (E.M. Sterling, T.D. Sterling)**

2023699231

Economics and Politics in the Assessment of Causes of Building Illness: The NAS/NRC Report on Indoor Pollutants. International Journal of Health Services, 14(1):43-53, 1984. (T.D. Sterling)

Possible Carcinogenic Components of Indoor Air: Combustion Byproducts, Formaldehyde, Mineral Fibers, Radiation, and Tobacco Smoke. Journal of Environmental Science and Health, C2(2):185-230, 1984. (T.D. Sterling, A. Arundel)

Effects of Restricting and Prohibiting Smoking in Office Environments on Reactions of Office Personnel to Environmental Health and Stress Factors. pp.329-334 in Indoor Air (Vol.2), B. Berglund, T. Lindvall, J. Sundell (eds), Swedish Council for Building Research, Stockholm, 1984. (T.D. Sterling)

Comparison of Non-Smokers' and Smokers' Perceptions of Environmental Conditions and Health and Comfort Symptoms in Office Environments With and Without Smoking. pp.34-40 in Ergonomics and Health in Modern Offices, E. Grandjean (ed), Taylor and Francis, Philadelphia, 1984. (T.D. Sterling, E.M. Sterling)

Investigations on the Effect of Regulating Smoking on Levels of Indoor Pollution and on the Perception of Health and Comfort of Office Workers. European Journal of Respiratory Disease, 65(133):17-32, 1984. (T.D. Sterling, E.M. Sterling)

Volatile Organic Compounds in Indoor Air: An Overview of Sources, Concentrations, and Health Effects. pp.387-402 in Indoor Air and Human Health, R.B. Gammage, S.V. Kaye (eds), Lewis Publishers Inc., Oak Ridge, 1985. (D.A. Sterling)

Building Performance Database. pp.218-222 in Proceedings, International Conference on Building Use & Safety Technology, Los Angeles, 1985. (E.M. Sterling, J.F. Steeves, C.D. Wrigley, T.D. Sterling, J.J. Weinkam)

An Empirical Study of Health and Comfort of Workers in Contemporary Office Environments. pp.212-217 in Proceedings, International Conference on Building Use & Safety Technology, Los Angeles, 1985. (E.M. Sterling, T.D. Sterling)

Energy and Environment Optimization. pp.203-207 in Proceedings, International Conference on Building Use & Safety Technology, Los Angeles, 1985. (E.D. McIntyre, E.M. Sterling)

Pollution Concentrations in Buildings. pp.279-284 in Proceedings, Research & Design 85: Architectural Applications of Design and Technology Research, Los Angeles, 1985. (E.M. Sterling, T.D. Sterling)

Summary of Characteristics Common to Sick Buildings. Environmental Health Review, 29(3):16, 1985. (E.M. Sterling, E.D. McIntyre)

2023699232

Criteria for Human Exposure to Humidity in Occupied Buildings.

ASHRAE Transactions, 91(1):611-621, 1985.

(E.M. Sterling, A.V. Arundel, T.D. Sterling)

Interrelations among Different Ventilation Parameters and Indoor Pollutants.

ASHRAE Transactions, 91(2):520-529, 1985. (E.M. Sterling, T.D. Sterling)

Sick Buildings: Case Studies of Tight Building Syndrome and Indoor Air Quality

Investigations in Modern Office Buildings. Environmental Health Review,

29(3):11-19, 1985.

(E.M. Sterling, E.D. McIntyre, C.W. Collett, T.D. Sterling, J. Meredith)

Indirect Health Effects of Relative Humidity in Indoor Environments. Environmental

Health Perspectives, 65:351-361, 1986.

(A.V. Arundel, E.M. Sterling, J.H. Biggin, T.D. Sterling)

Improving Air Quality in Energy Efficient Houses: An Architectural Approach. pp.66-69

in Proceedings, SESCO Renewable Energy Conference '86, Winnipeg, 1986.

(E.D. McIntyre, E.M. Sterling)

Evaluating Office Environments: The Case for a Macroergonomic Systems Approach.

pp.419-424 in Human Factors in Organizational Design and Management II,

O. Brown Jr., H.W. Hendrick (eds), North Holland Amsterdam, 1986. (A. Hedge,

E.M. Sterling, T.D. Sterling)

Building Illness Indices Based on Questionnaire Responses. pp.31-34 in Managing

Indoor Air for Health and Energy Conservation, ASHRAE IAQ '86, Atlanta, 1986.

(A. Hedge, E.M. Sterling, T.D. Sterling)

Results of a Mailed Questionnaire Study on the Health Effects of UFFI. Proceedings,

79th Annual Meeting of Air Pollution Control Association, Minneapolis, 1986.

(A. Arundel, A.J. Nantel, C.W. Collett, T.D. Sterling)

Indoor Air Quality - Total Environment Performance: Comfort and Productivity Issues in

Modern Office Buildings. Resource The Canadian Journal of Real Estate,

February:21-24, 1986. (E.M. Sterling)

A Phased Technique for Diagnosing Air Quality and Related Ventilation Problems.

pp.453-464 in Organization Design and Management, O. Brown, Jr.,

H.W. Hendrick (eds), North Holland, Amsterdam, 1986:

(E.M. Sterling, E.D. McIntyre, C.W. Collett, J. Meredith, T.D. Sterling)

The Impact of Building Ventilation on Indoor Gaseous and Particulate Pollutants in

Office and Institutional Buildings. pp.297-308 in Ventilation '85, H.D. Goodfellow

(ed), Pergamon Press, Toronto, 1986. (E.M. Sterling, T.D. Sterling)

2023699233

The Politics of Indoor Pollution: An Architectural, Engineering, and Epidemiological Overview. Immunology & Allergy Practice, December:21-31, 1986. (T.D. Sterling)

Effectiveness of Air Vapour Barriers Combined with Ventilated Crawl Spaces in Decreasing Residential Exposure to Radon Daughters. pp.142-147 in Indoor Radon, APCA International Specialty Conference, Philadelphia, 1986. (T.D. Sterling, A.V. Arundel, E.D. McIntyre, E.M. Sterling)

Why are Office Complexes and Their Occupants Feeling Under the Weather? Occupational Health & Safety Canada, 2(5):34-38, 1986. (T.D. Sterling)

Designing Office Buildings for Improved Environmental Quality. pp.175-179 in Indoor Air '87 (Vol.3), Fourth International Conference on Indoor Air Quality and Climate, Berlin, 1987. (R. Cole, E.M. Sterling)

Indoor Air Quality Investigation as a Psychological Stressor. pp.552-556 in Indoor Air '87 (Vol.2), B. Seifert (ed), Fourth International Conference on Indoor Air Quality and Climate, Berlin, 1987. (A. Hedge, E.M. Sterling, C.W. Collett, B. Mueller, R. Robson)

Review of the Effect of Indoor Relative Humidity on the Incidence of Airborne-Transmitted Infectious Diseases and on the Abundance of Allergenic Micro-Organisms. Proceedings, 80th Annual Meeting of Air Pollution Control Association, New York, 1987. (A.V. Arundel, E.M. Sterling)

Low Relative Humidity and Eye, Nose, Throat and Skin Irritation. pp.650-654 in Indoor Air '87 (Vol.2), B. Seifert (ed), Fourth International Conference on Indoor Air Quality and Climate, Berlin, 1987. (A.V. Arundel, C.W. Collett, E.M. Sterling, J. Steeves)

Office Building Investigation. pp.444-448 in Indoor Air '87 (Vol.2), B. Seifert (ed), Fourth International Conference on Indoor Air Quality and Climate, Berlin, 1987. (D.A. Sterling, D.J. Moschandreas, S.M. Relwani)

An Investigation of Volatile Organic Air Contaminants in the Indoor Manufactured Housing Environment. pp.169-173 in Indoor Air '87 (Vol.1), B. Seifert (ed), Fourth International Conference on Indoor Air Quality and Climate, Berlin, 1987. (D.A. Sterling, T.H. Stock)

The Building Performance Database: An Analytical Tool for Indoor Air Quality Research. pp.426-430 in Indoor Air '87 (Vol.2), B. Seifert (ed), Fourth International Conference on Indoor Air Quality and Climate, Berlin, 1987. (C.W. Collett, E.M. Sterling, E.D. McIntyre, J.F. Steeves, J.J. Weinkam)

2023699234



A Five Phased Strategy for Diagnosing Air Quality and Related Ventilation Problems in Commercial/Large Buildings. Proceedings, 80th Annual Meeting of Air Pollution Control Association, New York, 1987. (E.M. Sterling, C.W. Collett, J. Meredith)

Asbestos Contamination of Public and Commercial Buildings. BOMA B.C. News, (Guest Editorial), 10(10):4-5, 1987. (E.M. Sterling)

A Holistic Approach to "Sick Building Syndrome". Safety Management, 296(11):1-3, 1987. (E.M. Sterling)

Reducing Radon Levels in Tightly Sealed Residences Through Crawl Space. pp.132-138 in Practical Control of Indoor Air Problems, ASHRAE IAQ '87, Washington, D.C., 1987. (T.D. Sterling, E.D. McIntyre, E.M. Sterling)

Environmental Tobacco Smoke and Indoor Air Quality in Modern Office Work Environments. Journal of Occupational Medicine, 29(1):57-62, 1987. (T.D. Sterling, C.W. Collett, E.M. Sterling)

The Effect of Instituting Smoking Regulations in Office Buildings on Indoor Contaminant Levels. pp.66-71 in Practical Control of Indoor Air Problems, ASHRAE IAQ '87, Washington, D.C., 1987. (T.D. Sterling, C.W. Collett, B. Mueller, E.M. Sterling)

Environmental Tobacco Smoke and Indoor Air Quality in Modern Office Work Environments. Journal of Occupational Medicine, 29:457-489, 1987. (T.D. Sterling)

Perception of Daily Cigarette Consumption in the Office Environment. Bulletin of the Psychonomic Society, 26(2):120-123, 1988. (D.A. Sterling, D.J. Moschandreas)

Typical Pollutant Concentrations in Public Buildings. pp.399-404 in Indoor and Ambient Air Quality, R. Perry, P.W. Kirk (eds), Selver Ltd., London, 1988. (E.M. Sterling, C.W. Collett, S. Kleven, A.V. Arundel)

Levels and Control of Environmental Tobacco Smoke in Mechanically Ventilated Office Buildings. Proceedings, World Energy Engineers Congress, Atlanta, October, 1988. (E.M. Sterling, T.D. Sterling, C.W. Collett)

Concentrations of Nicotine, RSP, CO and CO<sub>2</sub> in Nonsmoking Areas of Offices Ventilated by Air Recirculated from Smoking Designated Areas. Proceedings, 81st Annual Meeting of APCA, Texas, 1988. (T.D. Sterling, B. Mueller)

ETS Concentrations Under Different Conditions of Ventilation and Smoking Regulation. Indoor and Ambient Air Quality, R. Perry, P.W. Kirk (eds), Selver Ltd., London, 1988. (T.D. Sterling)

2023699235

- Concentrations of Nicotine, RSP, CO and CO<sub>2</sub> in Nonsmoking Areas of Offices Ventilated by Air Recirculated from Smoking Designated Areas. American Industrial Hygiene Journal, 49(9):423-426, 1988. (T.D. Sterling, B. Mueller)
- Levels of Environmental Tobacco Smoke Under Different Conditions of Ventilation and Smoking Regulation. pp.223-235 in Combustion Processes and the Quality of the Indoor Environment, J.P. Harper (ed), Air & Waste Management Association, Niagara Falls, 1988. (T.D. Sterling, C.W. Collett, J.A. Ross)
- Reduction of ETS in Offices Through Designated Smoking Areas. pp.503-610 in Healthy Buildings '88, (Vol. 3), B. Berglund (ed), Swedish Council for Building Research, Stockholm, 1988. (T.D. Sterling, C.W. Collett)
- Indoor Environmental Quality: Who is Responsible? The Canadian Architect, February:38, 41, 1988. (T.D. Sterling)
- Sick Building Syndrome and Inadequate Ventilation. Proceedings, 81st Annual Meeting of Air Pollution Control Association, Dallas, 1988. (C.W. Collett, E.M. Sterling)
- Changing Sick Buildings into Healthy Buildings: Improving the Ventilation System. pp.55-60 in Healthy Buildings '88 (Vol.3), B. Berglund (ed), Swedish Council for Building Research, Stockholm, 1988. (C.W. Collett, E.M. Sterling, A.V. Arundel)
- A Strategy for Diagnosing and Solving Air Quality Problems in Office Buildings. Proceedings, APCA Specialty Conference on Chemical in the Environment, Whistler, 1988. (C.W. Collett, E.M. Sterling)
- The Epidemiology of Sick Public Buildings. Proceedings of the National Academy of Sciences Indoor Air Quality Symposium, San Carlos de Bariloche, Argentina, December 6-7, 1988. (E.M. Sterling)
- Healthy Buildings - Architecture as a Performing Art. British Columbia Real Market Review: Office & Industrial Leasing Guide Building Owners & Managers Association, Fall:34, 55, 1988. (E.M. Sterling, R. Hulbert)
- Economic Consequences of the New ASHRAE Ventilation Standard. Skylines, BOMA International, July:12-13, 1988. (E.M. Sterling)
- Arquitectura Y Calidad Del Aire De Los Edificios. Proceedings, Conference of the Argentine National Academy of Sciences, Bariloche, 1988. (E.M. Sterling)
- Building Architecture and Building Air Quality. Proceedings, Conference of the Argentine National Academy of Sciences, Bariloche, 1988. (E.M. Sterling)

2023699236

- Environmental Quality in Energy Efficient Office Buildings -- Architectural Design Considerations. pp.489-493 in Indoor and Ambient Air Quality, R. Perry, P.W. Kirk (eds), Selper Ltd., London, 1988. (E.M. Sterling, B. Palmquist)
- Indoor Air Quality and Health in Two Office Buildings With Different Ventilation Systems. Environment International, 15:115-128, 1989.  
(A. Hedge, T.D. Sterling, E.M. Sterling, C.W. Collett, D.A. Sterling, V. Nie)
- Indoor Air Quality in 12 Schools: A Case Study. pp.104-108 in The Human Equation: Health and Comfort, ASHRAE IAQ '89, San Diego, 1989.  
(D.M. Cousins, C.W. Collett)
- Prevalence of Health and Comfort Complaints of Office Workers: Male and Female Differences. pp.232-236 in The Human Equation: Health and Comfort, ASHRAE IAQ '89, San Diego, 1989. (S.R. Kleven, T.D. Sterling)
- Ventilation System Retrofits as a Method of Solution for the Sick Building Syndrome. pp.301-308 in Present and Future of Indoor Air Quality, C.J. Bieva, Y. Courtois, M. Govaerts (eds), Excerpta Medica, Amsterdam, 1989. (C.W. Collett, E.M. Sterling)
- A Database of Problem Buildings: Learning by Past Mistakes. pp.413-420 in Present and Future of Indoor Air Quality, C.J. Bieva, Y. Courtois, M. Govaerts (eds), Excerpta Medica, Amsterdam, 1989.  
(C.W. Collett, E.M. Sterling, T.D. Sterling, J.J. Weinkam)
- Ventilation Inadequacies and the Sick Building Syndrome. pp.367-371 in Ventilation '88, J.H. Vincent (ed), Pergamon Press, Oxford, 1989.  
(C.W. Collett, E.M. Sterling)
- A Guideline for Commissioning and Auditing Building Systems. British Columbia Real Market Review: Office & Industrial Leasing Guide Building Owners & Managers Association, Spring:26-29, 62 and 65, 1989. (E.M. Sterling)
- Designing Healthy Buildings: The Architect's Role in the Commissioning Process. Toronto Society of Architect's Newsletter, May, 1989. (E.M. Sterling)
- User Friendly Design Equals Healthy Buildings, Productive Tenants. Skylines, BOMA International, 14(11/12):16-17, 1989. (E.M. Sterling)
- Humidity Criteria for Buildings. The British Columbia Totem, B.C. Chapter, American Society of Heating, Refrigerating & Air Conditioning Engineers, 37(4):3-4, 1989.  
(E.M. Sterling)

2023699237

A Guideline for Commissioning and Auditing Building Systems. pp.519-521 in Ventilation '88, J.H. Vincent (ed), Pergamon Press, Oxford, 1989. (E.M. Sterling)

Designing Healthy Buildings: The Architect's Role in the Commissioning Process. ASHRAE Transactions, 95(1):893-894, 1989. (E.M. Sterling)

The New ASHRAE Ventilation Standard: Economy of Improving Indoor Air Quality. Energy Engineering, 86(6):26-33, 1989. (E.M. Sterling)

Is Smoking Regulation the Solution to Indoor Pollution Problems? British Columbia Office and Industrial Leasing Guide, Building Owners & Managers Association, September:90-92, 1989. (E.M. Sterling, C.W. Collett)

The Infiltration of Environmental Tobacco Smoke from Designated Smoking Areas to Smoking Prohibited Areas. pp.397-404 in Ventilation '88, J.H. Vincent (ed), Pergamon Press, Oxford, 1989. (T. Sterling, C.W. Collett)

Exposure to Environmental Tobacco Smoke in the Non-Industrial Workplace Under Different Conditions of Ventilation and Smoking Regulation. pp.111-118 in Present and Future of Indoor Air Quality, C.J. Bieve, Y. Courtois, M. Bovaerts (eds), Excerpta Medica, Amsterdam, 1989. (T.D. Sterling, C.W. Collett, J.A. Ross)

Indoor Air Quality and Health in Brazilian Homes. pp.301-304 In Indoor Air Quality and Ventilation, F. Lunau, G.L. Reynolds (eds), Selper Ltd., London, 1990. (D. Rumel, C.W. Collett, E.M. Sterling)

Indoor Air Quality in Two South American Office Buildings. pp.269-278 in Indoor Air Quality and Ventilation, F. Lunau, G.L. Reynolds (eds), Selper Ltd., London, 1990. (C.W. Collett, J.A. Ross)

Indoor Air Quality in Two Buildings in Ecuador. pp.395-400 in Indoor Air '90 (Vol.3), D.S. Walkinshaw (ed), Fifth International Conference on Indoor Air Quality and Climate, Toronto, 1990. (C.W. Collett, J.A. Ross)

Designing User Friendly Tall Buildings. pp.435-439 in Human Factors in Organizational Design and Management III, K. Noro, O. Brown Jr. (eds), Elsevier Science Publishers, North Holland, 1990. (E.M. Sterling)

ETS in Offices and When Smoking Is Restricted to Designated But Not Separately Ventilated Areas. Pp. 120-129, H. Kasuga (Ed.), Indoor Air Quality, Springer-Verlag, Berlin Heidelberg, 1990. (T.D. Sterling, B. Mueller)

2023699238

**Exposure of Homemakers to Toxic Contaminants: I. Differences in Chronic Conditions Between Homemakers and Employed Persons. Proceedings, 5th International Conference on Indoor Air Quality and Climate, July, Toronto, 1:471-476, 1990. (T.D. Sterling, D.A. Sterling, J.J. Weinkam)**

The Impact of Increased Ventilation on Indoor Air Quality. pp.97-100 in Healthy Buildings, ASHRAE IAQ '91, Washington, D.C., 1991.  
(C.W. Collett, J.A. Ventresca, S. Turner)

A Epidemiologia dos "Edifícios Doentes". Rev. Saude Publ. S. Paulo, 25(1):56-63, 1991. (T.D. Sterling, C.W. Collett, D. Rumel)

Nicotine, RSP, and CO<sub>2</sub> Levels in Bars and Nightclubs. Environmental International, 18:347-352, 1992. (C.W. Collett, J.A. Ross, K.B. Levine)

Are Indoor Air Quality Regulations Required For the White Collar Workplace?  
Proceedings, 5th International Jacques Cartier Conference, October, Montreal,  
 pp. 187-192, 1992. (E.M. Sterling, C.W. Collett)

Builders, Developers and the Environment. Proceedings, World Building Congress, Montreal PQ, May 18-22, 1992. (E.M. Sterling)

Design and Development of Healthy, Energy Efficient Office Buildings. Proceedings,  
World Building Congress, Montreal PQ, May 18-22, 1992. (E.M. Sterling)

Design and Development of an Energy-Efficient, Livable Office Building. pp. 230 - 234 in Proceedings, First Annual IAQ Conference & Exposition, National Coalition on Indoor Air Quality, Tampa, Florida, April 29 - 30, 1992. (E.M. Sterling).

Dry Climate Evaporative Cooling With Refrigeration Backup. ASHRAE Journal, June, 1992. (C.M. Scofield, E.M. Sterling)

Measurement of CO<sub>2</sub> Concentrations to Estimate Outdoor Air Ventilation Rates.  
Proceedings, AWMA 85TH Annual Meeting & Exhibition, Kansas City, MO,  
 June 21 - 26, 1992. (K.B. Levine, C.W. Collett, E.M. Sterling)

**Commissioning to Avoid Indoor Air Quality Problems.** *ASHRAE Journal*, October, 1992. (E.M. Sterling, C.W. Collett, S. Turner, C.C. Downing)

2023699239

Commissioning Buildings to Avoid Indoor Air Quality Problems. Proceedings, 5th International Jacques Cartier Conference, October, Montreal, pp. 201 - 209. 1992. (E.M. Sterling)

Commissioning to Avoid Indoor Air Quality Problems. ASHRAE Transactions, CH-93-5-4, 99(1), 1993. (E.M. Sterling, C.W. Collett, S. Tumer, C. Downing)

Estimation of Outdoor Air Ventilation Rates Using CO<sub>2</sub> Concentrations. ASHRAE Transactions, CH-93-22-4, 99(1), 1993 (K.B. Levine, E.M. Sterling, C.W. Collett)

Strategies for the Investigation of Indoor Air Quality Problems and Findings from Their Implementation. ASHRAE Transactions, DE-93-19-2, 1993. (C.W. Collett, J.A. Ross, E.M. Sterling)

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**List 2: Publications and presentations of epidemiological and statistical studies of relevance to ETS exposure and its effect on non-smokers, and publications and presentations dealing with epidemiological and statistical issues which, while not directly related to ETS issues, are relevant background materials.**

**\*\*The Statistician Vis-A-Vis Issues of Public Health. The American Statistician, 27(5):212-217, 1973. (T.D. Sterling)**

**\*\*A Critical Reassessment of the Evidence Bearing on Smoking as the Cause of Lung Cancer. American Journal of Public Health, 65(9):939-953, 1975. (T.D. Sterling)**

**\*\*A Critical Review of Reports on the Effect of Smoking on Sex and Fertility. The Journal of Sex Research, 11(3):201-217, 1975. (T.D. Sterling, D. Kobayashi)**

**\*\*Lung Cancer Among Black and White Migrants in the U.S. Journal of the National Medical Association, 67(2):106-111, 102, 1975. (T.F. Mancuso, T.D. Sterling)**

**Smoking Characteristics by Type of Employment. Journal of Occupational Medicine, 18(11):743-754, 1976. (T.D. Sterling, J.J. Weinkam)**

**\*\*New Evidence Concerning Smoking and Health. The Medical Journal of Australia, 2:538-542, 1977. (T.D. Sterling)**

**Smoking Patterns by Occupation, Industry, Sex, and Race. Archives of Environmental Health, November/December:313-317, 1978. (T.D. Sterling, J.J. Weinkam)**

**Does Smoking Kill Workers or Working Kill Smokers OR The Mutual Relationship Between Smoking, Occupation, and Respiratory Disease. International Journal of Health Services, 8(3):437-452, 1978. (T.D. Sterling)**

**\*\*Statistical Problems in Multi-Variate (Etiological) Surveys. The Canadian Journal of Statistics, 7(2):205-215, 1979. (T.D. Sterling)**

**The Mutual Relationship Between Smoking, Occupation and Disease. Arch. hig. rada. toksikol., 30:79-89, 1979. (T.D. Sterling)**

**\*\*Ventilatory Function Changes Over a Workshift. British Journal of Industrial Medicine, 38:152-155, 1981. (H.D. Dimich, T.D. Sterling)**

**Letter to Editor regarding "Non-smoking Wives of Heavy Smokers Have a Higher Risk of Lung Cancer". British Medical Journal, 282:1156, 1981. (T.D. Sterling)**

**\*\* Publications and presentations dealing with Epidemiological and Statistical issues which are not directly related to ETS issues, but are relevant background materials.**

2023699241

- \*\*Job Discrimination Based on Exposure Considerations and Smoking. Chapter 30 in Legal and Ethical Dilemmas in Occupational Health, J.S. Lee, W.N. Rom (eds), Ann Arbor Science Publishers, Michigan, 1982. (T.D. Sterling)
- \*\*Possible Effects on Occupational Lung Cancer From Smoking Related Changes in the Mucus Content of the Lung. Journal of Chronic Disease, 36(10):669-676, 1983. (T.D. Sterling)
- \*\*Perceived VS. Actual Risks: The Problem of Multiple Confounding. pp. 203-212 in The Analysis of Actual Versus Perceived Risks, V.T. Covello, W.G. Flamm, J.V. Rodricks, R.G. Tardiff (eds), Plenum Publishing Corporation, 1983. (T.D. Sterling)
- The Possible Attributable Risks From Occupation Hazards and Cigarette Smoking. International Epidemiological Association, Vancouver, 1984. (T.D. Sterling, A. Glicksman, J. Helfrick, H. Perry, M. Rubenfire, J.J. Weinkam)
- \*\*Health Effects of Chlorophenol Wood Preservatives on Sawmill Workers. International Journal of Health Services, 12(4):559-571, 1984. (T.D. Sterling, L.D. Stoffman, D.A. Sterling, G. Mate)
- \*\*Filtering Information About Occupation, Smoking and Disease. Journal of Chronic Diseases, 37(3):227-230, 1984. (T.D. Sterling)
- \*\*The "Healthy Worker Effect" on Morbidity Rates. Journal of Occupational Medicine, 27(7):477-482, 1985. (T.D. Sterling, J.J. Weinkam)
- Nonsmoker Lung Cancer Risks From Tobacco Smoke Exposure: An Evaluation of Repace and Lowrey's Phenomenological Model. Journal of Environmental Science, C4(1):93-118, 1986. (A. Arundel, T. Irwin, T.D. Sterling)
- \*\*Extent, Persistence, and Constancy of the Healthy Worker or Healthy Person Effect by All and Selected Causes of Death. Journal of Occupational Medicine, 28(5):348-353, 1986. (T.D. Sterling, J.J. Weinkam)
- \*\*Dose-Response Effects of UFFI. Proceedings, 79th Annual Meeting of Air Pollution Control Association, Minneapolis, 1986. (T.D. Sterling, C.W. Collett, A.J. Nantel)
- Never Smoker Lung Cancer Risks From Exposure to Particulate Tobacco Smoke. Environmental International, 13:409-426, 1987. (A. Arundel, T.D. Sterling, J.J. Weinkam)
- \*\*Smoking and Hospital Utilization. Social Science and Medicine, 24(11):983-986, 1987. (J.J. Weinkam, W.L. Rosenbaum, T.D. Sterling)
- \*\* Publications and presentations dealing with Epidemiological and Statistical issues which are not directly related to ETS issues, but are relevant background materials.

2023699242



\*\*Changes in Smoking Characteristics by Type of Employment From 1970 to 1979/80. American Journal of Industrial Medicine, 11:539-561, 1987. (J.J. Weinkam, T.D. Sterling)

\*\*Errors in Estimates of Smoking-Related Deaths Derived from Nonsmoker Mortality. Risk Analysis, 7(4):463-475, 1987. (T.D. Sterling, J.J. Weinkam)

The Epidemiology of "Sick Public Buildings". Proceedings, Indoor Air Quality, The National Academy of Sciences of Buenos Aires, Argentina, 1988. (T.D. Sterling, S. Kleven)

Exposure and Risk-Based Estimates of Never Smoke Lung Cancer Deaths in the U.S. in 1980 From Exposure to ETS. pp.242-251 in Indoor and Ambient Air Quality. R. Perry, P.W. Kirk (eds), Selper Ltd., London, 1988. (A. Arundel, T.D. Sterling, J.J. Weinkam)

\*\*Model for the Joint Influence of Occupational Exposure to Carcinogenic Dust and to Cigarette Smoke and Occupational Lung Cancer. Proceedings, Biological Interaction of Inhaled Mineral Fibers and Cigarette Smoke, Seattle, 1988. (T.D. Sterling)

\*\*Possible Masking Of Occupational Risk Due to a Failure to Adjust for Confounding Between Occupation and Smoking. Presented to Office of Safety and Health Administration, October 24, 1988. (T.D. Sterling, J.J. Weinkam, T.M. Poland)

\*\*Comparison of Smoking Related Risk Factors Among Black and White Males. American Journal of Industrial Medicine, 15:319-333, 1989. (T.D. Sterling, J.J. Weinkam)

\*\*Theory (or model) of the Joint Influence of Occupational Exposure to Carcinogenic Dust and to Cigarette Smoke and Occupational Lung Cancer. Experimental Pathology, 37:181-185, 1989. (T.D. Sterling)

The Confounding of Occupation and Smoking and its Consequences. Social Sciences and Medicine, Special Issue on Tobacco and Health, 30(4):457-467, 1990. (T.D. Sterling, J.J. Weinkam)

\*\*Smoking Produced Mucus and Clearance of Particulates in the Lung. Proceedings, 29th Hanford Symposium on Health and the Environment, October, Richland, 1:263-275, 1990. (T.D. Sterling, T.M. Poland)

Publication Decisions Revisited: The Effect of the Outcome of Statistical Tests on the Decision to Publish and Vice Versa. American Statistician, 1991. (in press) (T.D. Sterling, K. Jang, W.L. Rosenbaum, J.J. Weinkam)

\*\* Publications and presentations dealing with Epidemiological and Statistical issues which are not directly related to ETS issues, but are relevant background materials.

2023699243

Relative Cancer Risk of Homemakers. pp. 601-604 in Computing Science and Statistics, E. Kerimidas (ed), Interface '91, Seattle, 1991. (T.D. Sterling, W.L. Rosenbaum, D.A. Sterling, J.J. Weinkam)

Letter to the Editor Regarding Janerich's Study of Childhood Cancer. New England Journal of Medicine, February 7:412, 1991. (T.D. Sterling, J.J. Weinkam)

\*\*A Practical Approach to Estimating the True Effect of Exposure Despite Imprecise Exposure Classification. American Journal of Industrial Medicine, 19:587-601, 1991. (J.J. Weinkam, W.L. Rosenbaum, T.D. Sterling)

Bias in the Attribution of Lung Cancer as Cause of Death and Its Possible Consequences in Establishing Smoking Related Risks. Epidemiology, 3(1):11-16, 1992. (T. Sterling, W. Rosenbaum, J. Weinkam)

\*\*Computation of Relative Risk Based on Simultaneous Surveys: An Alternative to Cohort and Case-Control Studies. American Journal of Epidemiology, 136:722-729, 1992. (J.J. Weinkam, W.L. Rosenbaum, T.D. Sterling)

2023699244

\*\* Publications and presentations dealing with Epidemiological and Statistical issues which are not directly related to ETS issues, but are relevant background materials.